(b) providing a gaseous catalyst precursor stream comprising a gaseous catalyst precursor that is capable of supplying atoms of a transition metal selected from the group consisting of Fe, Co, Mn, Ni, and Mo, said gaseous catalyst precursor stream being provided at a temperature below the decomposition temperature of said catalyst precursor;

(c) heating said CO gas stream to a temperature that is (i) above the decomposition temperature of said catalyst precursor and (ii) above the CO decomposition initiation temperature, to form a heated CO gas stream;

(d) mixing said heated CO gas stream with said gaseous catalyst precursor stream to rapidly heat said catalyst precursor to a temperature that is (i) above the decomposition temperature of said catalyst precursor, (ii) sufficient to promote the rapid formation of catalyst metal atom clusters and (iii) sufficient to promote the initiation and growth of single wall nanotube by the CO decomposition reaction, to form a suspension of single wall carbon nanotube products in the resulting gaseous stream; and

(e) separately recovering said single wall carbon nanotube products from said resulting gaseous stream, wherein said single wall carbon nanotube products are substantially free of solid contaminants other than catalyst atoms and have a tube diameter about 1 nm.

REMARKS

Applicants have cancelled claims 1-23 and have added new claims 24-39 which, with a few minor changes, were virtually copied from claims 1, 3, 8-11, 13-14, 16-17, 21, 24, 26, and 28-30 of the Smalley PCT/US99/25702 (hereinafter, Smalley '702 PCT) for the purpose of provoking an interference with Smalley U.S. patent applications claiming the same subject matter. In this regard, Applicants have also submitted a 37 C.F.R. 1.604(a) REQUEST FOR

AN INTERFERENCE WITH AN APPLICATION(S) and a PRELIMINARY REMARKS UNDER 37 C.F.R. 1.604(b).

Applicants believe that claims 24-39 are patentable in all respects and submit herein as Exhibit A a claim chart showing various examples of written description support from the Applicants' specification.

In view of the foregoing remarks, applicants respectfully requests consideration of the above-identified application, preliminary amendment, preliminary remarks, and request for interference. Early and favorable declaration of an interference between the present application and any of the Smalley U.S. applications identified in the Applicants' request for an interference is respectfully requested.

If there are any questions, the Examiner is asked to contact the Applicants' attorney. If there are any additional charges, please charge them to the firm deposit account no. 50-0540.

Respectfully submitted

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PATENT
(100647-3845)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Moy et al.
Serial No.	:	To be assigned
Filed	:	April 20, 2001
For	:	Process for Producing Single Wall Nanotubes Using Unsupported Metal Catalysts and Single Wall Nanotubes Produced According to this Method
Group Art Unit:		To be assigned
Examiner	:	To be assigned

919 Third Avenue
New York, New York 10022

PRELIMINARY REMARKS
UNDER 37 C.F.R. 1.604(b)

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Pursuant to 37 C.F.R. § 1.604(b), notice is hereby given that each of claims 24-39 of the present application is believed to define the same patentable invention of at least one claim in pending application Serial No. 60/106,917, 60/114,588, 60/117,287, and 60/161,728.

Respectfully submitted

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37 C.F.R. 1.604(a) REQUEST FOR AN INTERFERENCE WITH AN APPLICATION(S)

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

I. 37 C.F.R. 1.604(a)(1)

Applicants propose the following count, which is comprised of the independent claims of the present application:

Claims 24 or 39 of the Moy application

It should particularly be noted that, pursuant to the Commissioner's opinion in Orikasa v. Oonishi, 10 U.S.P.Q.2d 1996 (Comm'r 1990), it is appropriate to use a count of this type where the recited claims are in different statutory classes so long as the subject matter recited in the various claims is not patentably distinct.

In addition, as noted in Section IV of this request, a proposed form PTO-850 is submitted herewith as Exhibit B for the Examiner's convenience.

II. 37 C.F.R. 1.604(a)(2)

Applicants have, with some minor changes, virtually copied their claims 24-39 of the present application from claims 1, 3, 8-11, 13-14, 16-17, 21, 24, 26, and 28-30 of the Smalley PCT/US99/25702 (hereinafter, Smalley '702 PCT). The Smalley '702 PCT identified four U.S. applications as its priority applications: Serial Nos. 60/106,917, 60/114,588, 60/117,287, and 60/161,728. Thus, it follows that the copied and other related claims from the Smalley '702 PCT must also be present in any one or all of those U.S. patent applications. However, under 37 C.F.R. 1.11, patent application files are not open to the public until after a patent issues. Thus, Applicants are unable to identify with absolute certainty which claims from which of Smalley's U.S. applications correspond to the proposed count.

At best, Applicants identify all four Smalley U.S. applications (Serial Nos. 60/106,917, 60/114,588, 60/117,287, and 60/161,728) as containing claims which would correspond to the proposed count. Applicants also identify the following claims from the Smalley '702 PCT as defining the same patentable invention as Moy claims 24-39:

Claims 1-3, 8-31, 46-54 of the Smalley '702 PCT.

III. 37 C.F.R. 1.604(a)(3)

Where two or more parties claim the same patentable invention, an interference should be declared to determine the patentability and priority of invention between the two parties. 35 U.S.C. 135; 37 C.F.R. 1.601(i). Claims covering the same patentable invention are defined in accordance with the following rule:

> Invention "A" is the same patentable invention as an invention "B" when invention "A" is the same as (35 U.S.C. 102) or is obvious (35 U.S.C. 103) in view of invention "B" assuming invention "B" is prior art with respect to invention "A". Invention "A" is a separate patentable invention with respect to invention "B" when invention "A" is new (35 U.S.C. 102) and non-obvious (35 U.S.C.

103) in view of invention "B" assuming invention "B" is prior art with respect to invention "A".

37 C.F.R. 1.601(n). Here, Applicants, with some minor changes, have virtually copied claims 1, 3, 8-11, 13-14, 16-17, 21, 24, 26, and 28-30 from the Smalley '702 PCT. Thus, each of these claims as well as others from the Smalley '702 PCT are the same or obvious in view of a corresponding claim from the Applicants' claims.

A claim chart illustrating a side by side comparison how the various copied and other related claims 1-3, 8-31, 46-54 from the Smalley '702 PCT are the same or obvious in view of Applicants' claims 24-39 is attached as Exhibit A.

IV. SUBMISSION OF PTO FORM

Submitted herewith as Exhibit B for the convenience of the Examiner is a proposed form PTO-850.

Respectfully submitted

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EXHIBIT A

CLAIMS		SUPPORT IN MOY'S APPLICATION
24.	A method for producing single wall carbon nanotube products comprising the steps of:	P. 1, line 8, "This invention relates to a method for producing single wall carbon nanotube..."
(a)	providing a CO gas stream;	P. 5, lines 15-19, "The invention relates to a gas phase reaction in which a gas phase metal containing compound is introduced into a reaction mixture also containing a gaseous carbon source. The carbon source is typically a C_1 through C_6 compound having as hetero atoms H, O, N, S or C1, optionally mixed with hydrogen. Carbon monoxide or carbon monoxide and hydrogen is a preferred carbon feedstock."
(b)	providing a gaseous catalyst precursor stream comprising a gaseous catalyst precursor that is capable of supplying atoms of a transition metal selected from the group consisting of Fe, Co, Mn, Ni, and Mo, said gaseous catalyst precursor stream being provided at a temperature below the decomposition temperature of said catalyst precursor;	P. 6, line 12-16, "Catalytically active metals include Fe, Co, Mn, Ni and Mo. Molybdenum carbonyls and Iron carbonyls are the preferred metal containing compounds which can be decomposed under reaction conditions to form vapor phase catalyst. Solid forms of these metal carbonyls may be delivered to a pretreatment zone where they are vaporized, thereby becoming the vapor phase precursor of the catalyst." P. 7, lines 17-20, "A metal containing compound, preferably a metal carbonyl, is vaporized at a temperature below its decomposition point, reactant gases CO or CO/H_2 sweep the precursor into the reaction zone 34..."
(c)	heating said CO gas stream to a temperature that is (i) above the decomposition temperature of said catalyst precursor and (ii) above the CO decomposition temperature, to form a heated CO gas stream; and	P. 5, lines 20-23, "Increased reaction zone temperatures of approximately 400°C to 1300°C and pressures of between ~0 and ~100 p.s.i.g., are believed to cause decomposition of the gas phase metal containing compound to a metal containing catalyst. Decomposition may be to the atomic metal or to a partially decomposed intermediate species. The metal containing catalysts (1) catalyze CO decomposition and (2) catalyze SWNT formation."
(d)	mixing said heated CO gas stream with said gaseous catalyst precursor stream to rapidly heat said catalyst precursor to a temperature that is (i) above the decomposition temperature of said catalyst precursor, (ii)	P. 5, line 20-p. 6, line 1, "Increased reaction zone temperatures of approximately 400°C to 1300°C and pressures of between ~0 and ~100 p.s.i.g., are believed to cause decomposition of the gas phase metal containing compound to a metal

	CLAIMS	SUPPORT IN MOY'S APPLICATION
	sufficient to promote the rapid formation of catalyst metal atom clusters and (iii) sufficient to promote the initiation and growth of single wall nanotube by the CO decomposition reaction, to form a suspension of single wall carbon nanotube products in the resulting gaseous stream.	containing catalyst. Decomposition may be to the atomic metal or to a partially decomposed intermediate species. The metal containing catalysts (1) catalyze CO decomposition and (2) catalyze SWNT formation." P. 7, line 22 to p. 8, line 3, "[A]t the reactor temperature, the metal containing compound is decomposed either partially to an intermediate species or completely to metal atoms. These intermediate species and/or metal atoms coalesce to larger aggregate particles which are the actual catalyst. The particle then grows to the correct size to both catalyze the decomposition of CO and promote SWNT growth."
25.	The method of claim 24 further comprising the step of separately recovering said single wall carbon nanotube products from said resulting gaseous stream.	P. 8, lines 3-4, "In the apparatus of Fig. 1, the catalyst particles and the resultant carbon forms are collected on the quartz wool plug **36**."
26.	The method of claim 24 wherein said catalyst precursors is a metal-containing compound of a metal selected from the groups consisting of molybdenum, iron, nickel, cobalt, and manganese.	P. 6, line 12-16, "Catalytically active metals include Fe, Co, Mn, Ni and Mo. Molybdenum carbonyls and Iron carbonyls are the preferred metal containing compounds which can be decomposed under reaction conditions to form vapor phase catalyst.
27.	The method of claim 26 wherein said metal-containing compound is a metal carbonyl.	P. 6, line 9-11, "Examples of metal containing compounds useful in the invention include metal carbonyls, metal acetyl acetonates, and other materials which under decomposition conditions can be introduced as a vapor which decomposes to form an unsupported metal catalyst."
28.	The method of claim 27 wherein said metal carbonyl is selected from the group consisting of $Fe(CO)_5$ or $Mo(CO)_6$.	P. 6, line 12-16, "Molybdenum carbonyls and Iron carbonyls are the preferred metal containing compounds which can be decomposed under reaction conditions to form vapor phase catalyst.
29.	The method of claim 24 wherein said CO gas stream is provided at a pressure of about 0 p.s.i.g. to about 100 p.s.i.g.	P. 5, lines 20-23, "Increased reaction zone temperatures of approximately 400°C to 1300°C and pressures of between ~0 and ~100 p.s.i.g., are believed to cause decomposition of the gas phase metal containing compound to a metal containing

CLAIMS		SUPPORT IN MOY'S APPLICATION
		catalyst."
30.	The method of claim 24 wherein said gaseous catalyst precursor stream is supplied in a CO gas stream.	P. 5, lines 15-17, "The invention relates to a gas phase reaction in which a gas phase metal containing compound is introduced into a reaction mixture also containing a gaseous carbon source.
31.	The method of claim 30 wherein the partial pressure of said catalyst precursor is from about 0.25 Torr to about 10 Torr.	Example 4, p. 10, line 11, "The vapor pressure of $Mo(CO)_6$ varied from 0.6-10 Torr." Example 5, p. 10, lines 20-21, "The vapor pressure of $Mo(CO)_6$ varied from 0.6-2 Torr." Example 6, p. 11, lines 6-7, "Vapor pressure of catalyst was nearly constant at ~0.6 Torr."
32.	The method of claim 24 wherein said gaseous catalyst precursor stream is supplied at a temperature in the range of from about 70°C to about 80°C.	Example 4, p. 10, lines 9-11, "[T]he vaporizer temperature was raised to 70°C. Over the course of the run (1.5 hrs) the vaporizer temperature rose to 80°C due to heat from the reactor furnace."
33.	The method of claim 24 wherein said CO gas stream is heated to a temperature in the range of from about 400°C to about 1300°C.	P. 5, line 20, "Increased reaction zone temperatures of approximately 400°C to 1300°C..."
34.	The method of claim 24 wherein said catalyst precursor is heated to a temperature in the range of from about 400°C to about 1300°C.	P. 5, line 20, "Increased reaction zone temperatures of approximately 400°C to 1300°C..."
35.	The method of claim 25 wherein said single wall carbon nanotube products are substantially free of solid contaminants other than catalyst atoms.	P. 4, line 23- p. 5, line 2, "Single walled nanotubes contaminated with the support material are obviously less desireable compared to single-walled nanotubes not having such contamination."
36.	The method of claim 25 wherein said single wall carbon nanotube products have a tube diameter about 1 nm.	Example 4, p. 10, lines 14-15, "SWNT with diameters ~1.5 nm were also produced." Example 5, p. 11, line 1, "SWNT with diameters varying from ~1-3 nm." Example 6, p. 11, line 10, "SWNT, 1-3 nm in diameter were also produced."

CLAIMS		SUPPORT IN MOY'S APPLICATION
37.	The method of claim 24 further comprising the step of controlling the diameter of the single wall carbon nanotube products recovered by controlling the catalyst cluster size at the time the growth reaction is initiated.	P. 8, lines 5-9, "Rate of growth of the particles depends on the concentration of the gas phase metal containing intermediate species. This concentration is determined by the vapor pressure (and therefore the temperature) in the vaporizer. If the concentration is too high, particle growth is too rapid, and structures other than SWNT are grown (e.g., MWNT, amorphous carbon, onions, etc.)."
38.	The method of claim 37 wherein said catalyst cluster size is controlled by controlling the temperature or controlling the vapor pressure of the gaseous catalyst precursor.	P. 8, lines 5-9, "Rate of growth of the particles depends on the concentration of the gas phase metal containing intermediate species. This concentration is determined by the vapor pressure (and therefore the temperature) in the vaporizer. If the concentration is too high, particle growth is too rapid, and structures other than SWNT are grown (e.g., MWNT, amorphous carbon, onions, etc.)."
39.	A single wall carbon nanotube product made by the process comprising the steps of. (a) providing a CO gas stream; (b) providing a gaseous catalyst precursor stream comprising a gaseous catalyst precursor that is capable of supplying atoms of a transition metal selected from the group consisting of Fe, Co, Mn, Ni, and Mo, said gaseous catalyst precursor stream being provided at a temperature below the decomposition temperature of said catalyst precursor; (c) heating said CO gas stream to a temperature that is (i) above the decomposition temperature of said catalyst precursor and (ii) above the CO decomposition temperature, to form a heated CO gas stream; and (d) mixing said heated CO gas stream with said gaseous catalyst precursor stream to rapidly heat said catalyst precursor to a temperature that is (i) above the decomposition temperature of said catalyst precursor, (ii) sufficient to promote the rapid formation of catalyst metal	P. 5, lines 15-19, "The invention relates to a gas phase reaction in which a gas phase metal containing compound is introduced into a reaction mixture also containing a gaseous carbon source. The carbon source is typically a C_1 through C_6 compound having as hetero atoms H, O, N, S or C1, optionally mixed with hydrogen. Carbon monoxide or carbon monoxide and hydrogen is a preferred carbon feedstock." P. 6, line 12-16, "Catalytically active metals include Fe, Co, Mn, Ni and Mo. Molybdenum carbonyls and Iron carbonyls are the preferred metal containing compounds which can be decomposed under reaction conditions to form vapor phase catalyst. Solid forms of these metal carbonyls may be delivered to a pretreatment zone where they are vaporized, thereby becoming the vapor phase precursor of the catalyst." P. 7, lines 17-20, "A metal containing compound, preferably a metal carbonyl, is vaporized at a temperature below its decomposition point, reactant gases CO or CO/H_2 sweep the precursor into the reaction zone 34..."

CLAIMS	SUPPORT IN MOY'S APPLICATION
atom clusters and (iii) sufficient to promote the initiation and growth of single wall nanotube by the CO decomposition reaction, to form a suspension of single wall carbon nanotube products in the resulting gaseous stream. (e) separately recovering said single wall carbon nanotube products from said resulting gaseous stream, wherein said single wall carbon nanotube products are substantially free of solid contaminants other than catalyst atoms and have a tube diameter about 1 nm.	P. 5, lines 20-23, "Increased reaction zone temperatures of approximately 400°C to 1300°C and pressures of between ~0 and ~100 p.s.i.g., are believed to cause decomposition of the gas phase metal containing compound to a metal containing catalyst. Decomposition may be to the atomic metal or to a partially decomposed intermediate species. The metal containing catalysts (1) catalyze CO decomposition and (2) catalyze SWNT formation." P. 5, line 20-p. 6, line 1, "Increased reaction zone temperatures of approximately 400°C to 1300°C and pressures of between ~0 and ~100 p.s.i.g., are believed to cause decomposition of the gas phase metal containing compound to a metal containing catalyst. Decomposition may be to the atomic metal or to a partially decomposed intermediate species. The metal containing catalysts (1) catalyze CO decomposition and (2) catalyze SWNT formation." P. 7, line 22 to p. 8, line 3, "[A]t the reactor temperature, the metal containing compound is decomposed either partially to an intermediate species or completely to metal atoms. These intermediate species and/or metal atoms coalesce to larger aggregate particles which are the actual catalyst. The particle then grows to the correct size to both catalyze the decomposition of CO and promote SWNT growth." P. 8, lines 3-4, "In the apparatus of Fig. 1, the catalyst particles and the resultant carbon forms are collected on the quartz wool plug **36**." P. 4, line 23- p. 5, line 2, "Single walled nanotubes contaminated with the support material are obviously less desireable compared to single-walled nanotubes not having such contamination." Example 4, p. 10, lines 14-15, "SWNT with diameters ~1.5 nm were also produced."

CLAIMS	SUPPORT IN MOY'S APPLICATION
	Example 5, p. 11, line 1, "SWNT with diameters varying from ~1-3 nm." Example 6, p. 11, line 10, "SWNT, 1-3 nm in diameter were also produced."

CLAIM CHART COMPARING CORRESPONDING CLAIMS BETWEEN MOY AND SMALLEY

MOY'S APPLICATION		SMALLEY'S WO 00/26138 PCT/US99/25702
24.	A method for producing single wall carbon nanotube products comprising the steps of:	1. A method for producing single wall carbon nanotube products comprising the steps of:
(a)	providing a CO gas stream;	(a) providing a high pressure CO gas stream; *Moy's CO gas stream overlaps with Smalley's high pressure CO gas stream.*
(b)	providing a gaseous catalyst precursor stream comprising a gaseous catalyst precursor that is capable of supplying atoms of a transition metal selected from the group consisting of Fe, Co, Mn, Ni and Mo, said gaseous catalyst precursor stream being provided at a temperature below the decomposition temperature of said catalyst precursor;	(b) providing a gaseous catalyst precursor stream comprising a gaseous catalyst precursor that is capable of supplying atoms of a transition metal selected from Group VI, Group VIII or mixture thereof, said gaseous catalyst precursor stream being provided at a temperature below the decomposition temperature of said catalyst precursor; *Moy's claimed Fe, Co, Mn, Ni, and Mo includes Group VI and Group VIII transition metals*
(c)	heating said CO gas stream to a temperature that is (i) above the decomposition temperature of said catalyst precursor and (ii) above the CO decomposition initiation temperature, to form a heated CO gas stream; and	(c) heating said high pressure CO gas stream to a temperature that is (i) above the decomposition temperature of said catalyst precursor and (ii) above the minimum Boudouard reaction initiation temperature, to form a heated CO gas stream; and *The Boudouard reaction is the same as the CO decomposition reaction.*
(d)	mixing said heated CO gas stream with said gaseous catalyst precursor stream to rapidly heat said catalyst precursor to a temperature that is (i) above the decomposition temperature of said catalyst precursor, (ii) sufficient to promote the rapid formation of catalyst metal atom clusters and (iii) sufficient to promote the initiation and growth of single wall nanotube by the CO decomposition reaction, to form a suspension of single wall carbon nanotube products in the resulting gaseous stream.	(d) mixing said heated CO gas stream with said gaseous catalyst precursor stream in a mixing zone to rapidly heat said catalyst precursor to a temperature that is (i) above the decomposition temperature of said catalyst precursor, (ii) sufficient to promote the rapid formation of catalyst metal atom clusters and (iii) sufficient to promote the initiation and growth if single wall nanotube by the Boudouard reaction, to form a suspension of single wall carbon nanotube products in the resulting gaseous stream. *The Boudouard reaction is the same as the CO decomposition*

MOY'S APPLICATION	SMALLEY'S WO 00/26138 PCT/US99/25702
	reaction.
	2. The method of claim 1, further comprising the step of passing said suspension of single wall nanotube products through a growth and annealing zone. *Moy claim 24 includes the growth of single wall nanotubes and thus, this additional step is anticipated and/or obvious in view of Moy claim 24.*
25. The method of claim 24 further comprising the step of separately recovering said single wall carbon nanotube products from said resulting gaseous stream.	3. The method of claim 1 or 2 further comprising the step of separately recovering said single wall carbon nanotube products from said resulting gaseous stream.
26. The method of claim 24 wherein said catalyst precursors is a metal-containing compound of a metal selected from the groups consisting of molybdenum, iron, nickel, cobalt and manganese.	8. The method of claim 1 wherein said catalyst precursors is a metal-containing compound of a metal selected from the groups consisting of tungsten, molybdenum, chromium, iron, nickel, cobalt, rhodium, ruthenium, palladium, osmium, iridium, platinum and mixtures thereof.
27. The method of claim 26 wherein said metal-containing compound is a metal carbonyl.	9. The method of claim 8 wherein said metal-containing compound is a metal carbonyl.
28. The method of claim 27 wherein said metal carbonyl is selected from the group consisting of $Fe(CO)_5$ or $Mo(CO)_6$.	10. The method of claim 9 wherein said metal carbonyl is selected from the group consisting of $Fe(CO)_5$, or $CO(CO)_6$ and mixture thereof.
29. The method of claim 24 wherein said CO gas stream is provided at a pressure of about 0 p.s.i.g. to about 100 p.s.i.g.	11. The method of claim 1 wherein said high pressure CO gas stream is provided at a pressure of about 3 atm to about 1000 atm. *Moy's claimed 0 to 100 p.s.i.g. overlaps with Smalley's claimed 3 to 1000 atm. Thus, this claim is anticipated and/or obvious in view of Moy claim 29.*
	12. The method of claim 11 wherein said high pressure CO gas stream is provided at a pressure of about 10 atm to about 100 atm.

MOY'S APPLICATION	SMALLEY'S WO 00/26138 PCT/US99/25702
	Moy's claimed 0 to 100 p.s.i.g. overlaps with Smalley's claimed 3 to 1000 atm. Thus, this claim is anticipated and/or obvious in view of Moy claim 29.
30. The method of claim 24 wherein said gaseous catalyst precursor stream is supplied in a CO gas stream.	13. The method of claim 1 wherein said gaseous catalyst precursor stream is supplied in a high pressure CO gas stream. *Moy's CO gas stream overlaps with Smalley's high pressure CO gas stream. Thus, this claim is anticipated and/or obvious in view of Moy claim 30.*
31. The method of claim 30 wherein the partial pressure of said catalyst precursor is from about 0.25 Torr to about 10 Torr.	14. The method of claim 13 wherein the partial pressure of said catalyst precursor in said high pressure CO gas stream is from about 0.25 Torr to about 100 Torr. *Moy's claimed .25 to 10 Torr overlaps with Smalley's .25 to 100 Torr. Thus, this claim is anticipated and/or obvious in view of Moy claim 31.*
	15. The method of claim 14 wherein said partial pressure of said catalyst precursor is from about 1 Torr to about 10 Torr. *Moy's claimed .25 to 10 Torr overlaps with Smalley's .25 to 100 Torr. Thus, this claim is anticipated and/or obvious in view of Moy claim 31.*
32. The method of claim 24 wherein said gaseous catalyst precursor stream is supplied at a temperature in the range of from about 70°C to about 80°C.	16. The method of claim 1 wherein said gaseous catalyst precursor stream is supplied at a temperature in the range of from about 70°C to about 200°C. *Moy's claimed 70 to 80°C overlaps with Smalley's 70 to 200°C. Thus, this claim is anticipated and/or obvious in view of Moy claim 32.*
33. The method of claim 24 wherein said CO gas stream is heated to a temperature in the range of from about 400°C to about 1300°C.	17. The method of claim 1 wherein said high pressure CO gas stream is heated to a temperature in the range of from about 850°C to about 1500°C.

MOY'S APPLICATION	SMALLEY'S WO 00/26138 PCT/US99/25702
	Moy's claimed 400 to 1300°C overlaps with Smalley's 850-1500°C. Thus, this claim is anticipated and/or obvious in view of Moy claim 33.
	18. The method of claim 17 wherein said temperature is from about 900°C to about 1100°C. *Moy's claimed 400 to 1300°C overlaps with Smalley's 900-1100°C. Thus, this claim is anticipated and/or obvious in view of Moy claim 33.*
	19. The method of claim 1 wherein said mixing step is effective to heat said catalyst precursor stream to the desired temperature in less than about 10 millisec. *Moy's claimed mixing step to rapidly heat the catalyst precursor overlaps with Smalley's 10 millisec time. Thus, this claim is anticipated and/or obvious in view of Moy claim 24.*
	20. The method of claim 19 herein said mixing step is effective to heat said catalyst precursor stream to the desired temperature in from about 1 to 100 μsec. *Moy's claimed mixing step to rapidly heat the catalyst precursor overlaps with Smalley's 1 to 100 μsec time. Thus, this claim is anticipated and/or obvious in view of Moy claim 24.*
34. The method of claim 24 wherein said catalyst precursor is heated to a temperature in the range of from about 400°C to about 1300°C.	21. The method of claim 1 wherein said catalyst precursor is heated to a temperature in the range of from about 850°C to about 1250°C in said mixing zone. *Moy's claimed 400 to 1300°C overlaps with Smalley's 850-1250°C. Thus, this claim is anticipated and/or obvious in view of Moy claim 34.*
	22. The method of claim 2 wherein said growth and annealing zone is maintained at a temperature in the range of from about 850°C to about 1250°C. *Moy's claimed 400 to 1300°C overlaps with Smalley's 850-*

MOY'S APPLICATION	SMALLEY'S WO 00/26138 PCT/US99/25702
	1250°C. Additionally, growing nanotubes is claimed in Moy 24. Thus, this claim is anticipated and/or obvious in view of Moy claim 24.
	23. The method of claim 3 wherein said single wall carbon nanotube products are recovered by passing said suspension through a gas-permeable filter. *Moy claims the recovery of single wall carbon nanotubes from the gas stream. Thus, this claim is anticipated and/or obvious in view of Moy claim 25.*
35. The method of claim 25 wherein said single wall carbon nanotube products are substantially free of solid contaminants other than catalyst atoms.	24. The method of claim 3 wherein said single wall carbon nanotube products are substantially free of solid contaminates other than catalyst atoms.
	25. The method of claim 3 wherein said single wall carbon nanotube products are at least 99% single wall carbon nanotubes. *Moy's single wall carbon nanotubes are at least 99%, if not 100%, single wall carbon nanotubes. Thus, this claim is anticipated and/or obvious in view of Moy claim 25.*
36. The method of claim 25 wherein said single wall carbon nanotube products have a tube diameter about 1 nm.	26. The method of claim 3 wherein said single wall carbon nanotube products have a tube diameter in the range of from about 0.6 nm to about 0.8 nm. *Moy claims single wall nanotubes with diameter about 1 nm, which is very close to Smalley's .6 to .8 nm. Additionally, Moy's single wall carbon nanotube products of claim 25 would inherently include Smalley's .6 to .8 nm nanotubes. Thus, this claim is obvious in view of Moy claims 25 and 36.*
	27. The method of claim 3 wherein said single wall carbon nanotube products comprise (5,5) tubes. *Moy claims single wall nanotubes with diameter about 1 nm, which is very close to Smalley's (5,5) tubes. Additionally, Moy's*

MOY'S APPLICATION	SMALLEY'S WO 00/26138 PCT/US99/25702
	single wall carbon nanotube products of claim 25 would inherently include Smalley's (5,5) tubes. Thus, this claim is obvious in view of Moy claim 25 and 36.
37. The method of claim 24 further comprising the step of controlling the diameter of the single wall carbon nanotube products recovered by controlling the catalyst cluster size at the time the growth reaction is initiated.	28. The method of claim 1 further comprising the step of controlling the diameter of the single wall carbon nanotube products recovered by controlling the catalyst cluster size at the time the growth reaction is initiated.
38. The method of claim 37 wherein said catalyst cluster size is controlled by controlling the temperature or controlling the vapor pressure of the gaseous catalyst precursor.	29. The method of claim 28 wherein said catalyst cluster size is controlled by a method selected from the group consisting of: (a) controlling the presence of CO(P_{CO}) in the mixing zone; (b) controlling the temperature in the mixing zone; (c) controlling the partial pressure of the gaseous catalyst precursor (P_{cat}) provided to the mixing zone; (d) controlling the partial pressure of gaseous nucleating agents (P_N) provided to the mixing zone; or (e) mixtures of the foregoing. *Moy claims the step of controlling catalyst cluster size by controlling the temperature or controlling the vapor pressure of the gaseous catalyst precursor. Thus, this claim is anticipated and/or obvious in view of Moy claim 38.*
39. A single wall carbon nanotube product made by the process comprising the steps of. (a) providing a CO gas stream; (b) providing a gaseous catalyst precursor stream comprising a gaseous catalyst precursor that is capable of supplying atoms of a transition metal selected from the group consisting of Fe, Co, Mn, Ni and Mo, said gaseous catalyst precursor stream being provided at a temperature below the decomposition temperature of said catalyst precursor;	30. A single wall carbon nanotube product made by the process of any of claims 24, 25, 26 or 27. *The process of Smalley claims 24, 25, 26, or 27 is anticipated or obvious in view of Moy claim 35, 25, or 26. Thus, the single wall carbon nanotubes made by Smalley claims 24, 25, 26, or 27 are anticipated or obvious in view of the single wall carbon nanotubes made by Moy claims 25, 25, or 26. Thus, this claim is anticipated or obvious in view of Moy claim 39, which has been rewritten in independent form to incorporate the process of Moy*

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(c) heating said CO gas stream to a temperature that is (i) above the decomposition temperature of said catalyst precursor and (ii) above the CO decomposition initiation temperature, to form a heated CO gas stream; (d) mixing said heated CO gas stream with said gaseous catalyst precursor stream to rapidly heat said catalyst precursor to a temperature that is (i) above the decomposition temperature of said catalyst precursor, (ii) sufficient to promote the rapid formation of catalyst metal atom clusters and (iii) sufficient to promote the initiation and growth of single wall nanotube by the CO decomposition reaction, to form a suspension of single wall carbon nanotube products in the resulting gaseous stream; and (e) separately recovering said single wall carbon nanotube products from said resulting gaseous stream, wherein said single wall carbon nanotube products are substantially free of solid contaminants other than catalyst atoms and have a tube diameter about 1 nm.	*claims 35, 25, and 26.*
	31. The single wall carbon nanotube products of claim 30 which comprises ropes. *Moy's single wall carbon nanotube products made by claim 39 would inherently include clusters. Thus, this claim is anticipated and/or obvious in view of Moy claim 39.*
	46. A composition of matter comprising single-wall carbon nanotubes having a tube diameter in the range of 0.6 nm to 0.8 nm. *Moy's single wall carbon nanotube products made by claim 39 would inherently include Smalley's .6 to .8 nm nanotubes. Thus, this claim is anticipated and/or obvious in view of Moy claim 39*
	47. The composition of claim 38 wherein at least 95% of the

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	SWNTs in said composition have a diameter in the range of 0.6 nm to 0.8 nm. *Moy's single wall carbon nanotube products made by claim 39 would inherently include Smalley's .6 to .8 nm nanotubes. Thus, this claim is anticipated and/or obvious in view of Moy claim 39.*
	48. The composition of claim 38 wherein at least 75% of the SWNTs in said composition have a diameter in the range of 0.6 nm to 0.8 nm. *Moy's single wall carbon nanotube products made by claim 39 would inherently include Smalley's .6 to .8 nm nanotubes. Thus, this claim is anticipated and/or obvious in view of Moy claim 39*
	49. The composition of any matter of any of claims 38, 39, or 40 wherein said nanotubes are present as ropes. *Moy's single wall carbon nanotube products made by claim 39 would inherently include clusters. Thus, this claim is anticipated and/or obvious in view of Moy claim 39.*
	50. The composition of any matter of any of claims 38, 39, or 40 wherein said nanotubes are present (5,5) single-wall carbon nanotubes. *Moy's single wall carbon nanotube products made by claim 39 would inherently include Smalley's (5,5) single wall nanotubes. Thus, this claim is anticipated and/or obvious in view of Moy claim 39.*
	51. A composition of matter comprising (5,5) single-wall carbon nanotubes. *Moy's single wall carbon nanotube products made by claim 39 would inherently include Smalley's (5,5) single wall nanotubes. Thus, this claim is anticipated and/or obvious in view of Moy claim 39.*
	52. The composition of claim 43 wherein at least 50% of

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	SWNTs are (5,5) tubes. *Moy's single wall carbon nanotube products made by claim 39 would inherently include Smalley's (5,5) single wall nanotubes. Thus, this claim is anticipated and/or obvious in view of Moy claim 39.*
	53. The composition of claim 44 wherein at least 25% of SWNTs are (5,5) tubes. *Moy's single wall carbon nanotube products made by claim 39 would inherently include Smalley's (5,5) single wall nanotubes. Thus, this claim is anticipated and/or obvious in view of Moy claim 39.*
	54. The composition of matter of any of claims 43, 44, 45 wherein said nanotubes are present as ropes. *Moy's single wall carbon nanotube products made by claim 39 would inherently include clusters. Thus, this claim is anticipated and/or obvious in view of Moy claim 39.*

Form PTO-850

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

INTERFERENCE INITIAL MEMORANDUM

EXAMINERS INSTRUCTIONS: This form need not be typewritten. Complete the items below and forward to the Group Clerk with all files including the benefit of which has been accorded. The parties need not be listed in any specific order. Use a separate form for each count.

(See MPEP 2309.02)

BOARD OF PATENT APPEALS AND INTERFERENCES: An interference is found to exist between the following cases:

This is count 1 of 1 count(s)

1. NAME	SERIAL NO.	FILING DATE	PATENT NO., IF ANY
Moy et al.		**April 20, 2001**	
The claims of this party which correspond to this count are: 24, 25-38, 39		The claims of this party which do not correspond to this count are: None	

*Accorded benefit of:

COUNTRY	SERIAL NO.	FILING DATE	PATENT NO., IF ANY
U.S.A.	08/910,495	August 4, 1997	

2. NAME	SERIAL NO.	FILING DATE	PATENT NO., IF ANY
Smalley et al.	**60/106,917**	**November 3, 1998**	
The claims of this party which correspond to this count are:		The claims of this party which do not correspond to this count are:	

*Accorded benefit of:

COUNTRY	SERIAL NO.	FILING DATE	PATENT NO., IF ANY

3. NAME	SERIAL NO.	FILING DATE	PATENT NO., IF ANY
Smalley et al.	**60/114,588**	**December 31, 1998**	
The claims of this party which correspond to this count are:		The claims of this party which do not correspond to this count are:	

*Accorded benefit of:

COUNTRY	SERIAL NO.	FILING DATE	PATENT NO., IF ANY

4. NAME	SERIAL NO.	FILING DATE	PATENT NO., IF ANY
Smalley et al.	**60/117,287**	**January 26, 1999**	

The claims of this party which correspond to this count are:	The claims of this party which <u>do not</u> correspond to this count are:

*Accorded benefit of:

COUNTRY	SERIAL NO.	FILING DATE	PATENT NO., IF ANY

5. NAME **Smalley et al.**	**SERIAL NO.** **60/161,728**	**FILING DATE** **October 27, 1999**	**PATENT NO., IF ANY**

The claims of this party which correspond to this count are:	The claims of this party which <u>do not</u> correspond to this count are:

*Accorded benefit of:

COUNTRY	SERIAL NO.	FILING DATE	PATENT NO., IF ANY

If a claim of any party is exactly the same as this count, it should be circled above. If not, type the count in this space (attach additional sheet if necessary):

Explanation of why each claim designated as corresponding to the count is directed to the same patentable invention as the count:

The count is the union of independent claims designated as corresponding to the count.

*The serial number and filing date of each application the benefit of which is intended to be accorded must be listed. It is not sufficient to merely list the earliest application necessary for continuity.

DATE	PRIMARY EXAMINER	TELEPHONE No.	ART UNIT

NOTE: FORWARD ALL FILES INCLUDING THOSE BENEFIT OF WHICH IS BEING ACCORDED.	GROUP DIRECTOR SIGNATURE (if required)

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